TM 8-6515-005-24&P

TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

BRONCHOSCOPE, FLEXIBLE, FIBEROPTIC MODELS F3 AND F3G

6515-01-285-4617

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HEADQUARTERS, DEPARTMENT OF THE ARMY

1994

SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

Do not try to pull or grab the individual.

If possible, turn off the electrical power.

If you cannot turn off the electrical power, pull, push, or lift the person to safety using a dry wooden pole or a dry rope, or some other insulating material.

Send for help as soon as possible.

After the injured person is free of contact with the source of electrical shock, move the person a short distance away and immediately start artificial resuscitation.

Throughout this manual are WARNINGS, CAUTIONS, and NOTES. Please take time to read these. They are there to protect you and the equipment.

WARNING

Procedures which must be observed to avoid personal injury, and even loss of life.

CAUTION

Procedures which must be observed to avoid damage to equipment, destruction of equipment, or long-term health hazards.

NOTE

Essential information that should be remembered.

ELECTRICAL AND ELECTRONIC HAZARDS

» Severe injury or death can result when any part of your body comes in contact with live electrical circuits. Medical Equipment Repairers must be especially alert to the dangers of exposed circuits, terminals, power panels, and the like.

» The electrical parameter that injures and kills is CURRENT; the force that caused current to flow is called VOLTAGE. Voltage ratings are normally assigned to live electrical circuits, power supplies, and transmission lines. You should consider all voltages of 30 or more to be hazardous.

» The physiological effect of current flowing through the human body is related to the following factors:

- The path of the current through the body.
- The magnitude of the current.
- The duration of the voltage shock or discharge that causes current flow.
- The frequency of the voltage if alternating current.
- The susceptibility of damage to your heart from the current and from repeated shocks.

» Alternating current tends to concentrate near the body's surface because of the phenomenon of "skin effect." The higher the frequency of the alternating current voltage source, the more likely the current will tend to flow in or near the skin and away from internal body organs.

» The effect of current becomes more severe with the length of time that it flows through the body; a prolonged current flow can cause severe internal burns, collapse, unconsciousness, or death.

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WASHINGTON, DC

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You can help improve this manual. If you find any mistakes or if you know a way to improve procedures, please let us know. Mail your memorandum, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 (Recommended Changes to Equipment Technical Publications) located in the back of this manual to: Commander, U.S. Army Medical Materiel Agency, ATTN: SGMMA-M, Frederick, MD 21702-5001. A reply will be furnished directly to you.

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HOW TO USE THIS MANUAL

This manual provides all the information needed to understand the capabilities, functions, and characteristics of this equipment. It describes how to set up, operate, test, and repair the equipment. You must familiarize yourself with the entire manual before operating or beginning a maintenance task.

The manual is arranged by chapters, sections, and paragraphs followed by appendixes, a glossary, an index, and DA Forms 2028-2. Use the table of contents to help locate the chapter or section for the general subject area needed. The index will help locate more specific subjects.

Multiple figures and tables are provided for your ease in using this manual. Words that are both capitalized and in quotation marks are names of components or words that you will actually see on the equipment.

Chapter 3 provides a systematic method of inspecting and servicing the equipment. In this way, small defects can be detected early before they become a major problem causing the equipment to fail. Make a habit of doing the checks and services in the same order each time and anything wrong will be detected quickly.

Only perform maintenance functions specified in the maintenance allocation chart for your level of maintenance. Maintenance functions specified for higher levels of maintenance frequently require additional training; test, measurement, and diagnostic equipment; or tools.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Overview.

This manual describes the fiberoptic bronchoscope (fig 1-1); provides equipment technical data; and provides operational and maintenance functions, services, and actions. Additional information follows:

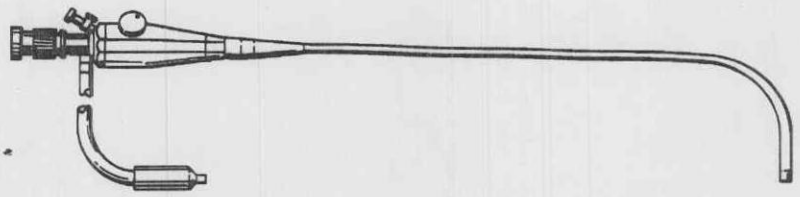

Figure 1-1. Fiberoptic bronchoscope.

a. Type of manual. Unit, direct support (DS), and general support (GS) maintenance (including repair parts and special tools list).

b. Model number and equipment name. Model numbers F3 and F3G, Bronchoscope, Flexible, Fiberoptic.

c. Purpose of equipment. To provide the capability to—

(1) View the interior of the respiratory tract to include the trachea and the branches of the lungs,

(2) Perform biopsies,

(3) Perform laser surgery,

(4) Insert radiographic media for bronchographic studies,

(5) Remove foreign objects, and

(6) Suction sputum for microbiological studies.

1-2. Explanation of abbreviations and terms.

Special or unique abbreviations, acronyms, and terms used in this manual are explained in the glossary.

1-3. Maintenance forms, records, and reports.

TB 38-750-2 prescribes forms, records, reports, and procedures.

1-4. Destruction of Army materiel to prevent enemy use.

AR 40-61 contains instructions for destruction and disposal of Army medical materiel. Also, the SB 8-75 series provides periodic information and/or instructions on the destruction of medical materiel.

1-5. Administrative storage.

a. Place the fiberoptic bronchoscope in administrative storage for only short periods of time when a shortage of maintenance effort exists. This equipment should be in mission readiness condition within 24 hours or within the time factors determined by the directing authority. During the storage period, keep appropriate maintenance records.

b. Perform preventive maintenance checks and services (PMCS) listed in tables 3-1 and 3-2 before placing Army equipment in administrative storage. When equipment is removed from storage, perform PMCS to ensure its operational readiness.

c. Inside storage is preferred for equipment selected for administrative storage.

1-6. Preparation for storage or equipment.

Procedures to prepare the fiberoptic bronchoscope for storing or shipping are listed in chapter 3, section VII.

1-7. Quality control (QC).

TB 740-10/DLAM 4155.5/AFR 67-43 contains QC requirements and procedures.

1-8. Nomenclature cross-reference list.

Table 1-1 identifies official versus commonly used nomenclatures.

Table 1-1. Nomenclature cross-reference list.

Common name	*Official nomenclature*
Biopsy forceps	Biopsy specimen forceps
Case	Carrying case
Channel	Forceps channel
Fiberoptic bronchoscope	Bronchoscope, flexible, fiberoptic
Flexible test gauge	Storage stylet

NOTE

A bronchoscope is also referred to as an endoscope.

1-9. Reporting and processing medical materiel complaints and/or quality improvement reports.

AR 40-61 prescribes procedures for submitting medical materiel complaints and/or quality improvement reports for the fiberoptic bronchoscope.

1-10. Warranty information.

A warranty is not applicable.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-11. Equipment characteristics, capabilities, and features.

a. The fiberoptic bronchoscope is specifically designed for either transoral or transnasal passage for diagnostic and therapeutic exploration of the bronchi.

b. The fiberoptic bronchoscope includes an automatic aspirator for lavage, introduction of medication, and aspiration with or without forceps in place.

c. A light carrier cable, attached to the proximal housing, provides for connection to a light source.

d. The proximal housing of the fiberoptic bronchoscope is designed to be held by the left hand and its controls operated with the finger tips.

e. A case with a foam insert holds the fiberoptic bronchoscope and all components and accessories.

1-12. Component and accessory descriptions.

a. Components.

(1) *Case (fig 1-2).* The high impact plastic "briefcase" incorporates a hinged lid, two latches, and a movable carrying handle. The case includes a foam insert with cutouts to store the fiberoptic bronchoscope and its components/accessories.

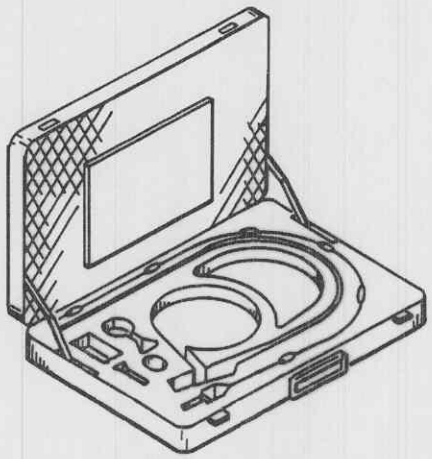

Figure 1-2. Case.

(2) *Biopsy forceps (fig 1-3).* The biopsy forceps are flexible to acquire biopsy specimens with minimal bleeding. The action of the biopsy forceps is manipulated with the finger ring control and handle.

(3) *Flexible test gauge (fig 1-4).* The flexible test gauge is a thin, spiral wire used to test the integrity of the channel. A cylindrical handle is molded onto one end for grasping. The flexible test gauge is stored in a circular plastic housing.

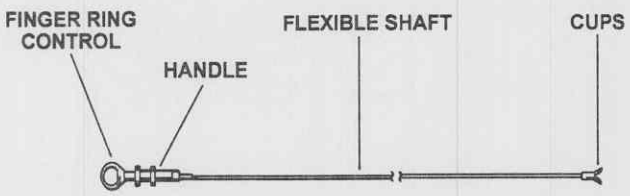

Figure 1-3. Biopsy forceps.

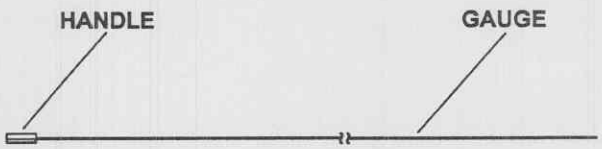

Figure 1-4. Flexible test gauge.

(4) *Eyeguard (fig 1-5).* The black rubber eyeguard permits a tight fit of a surgeon's eye to the fiberoptic bronchoscope to prevent room illumination from degrading the viewing field.

(5) *Eyepiece cover (fig 1-6).* The black, plastic eyepiece cover provides protection for the viewing aperture during storage.

Figure 1-5. Eyeguard.

Figure 1-6. Eyepiece cover.

(6) *Adapter (fig 1-7).* The adapter and color-coded plastic caps are used to connect the fiberoptic bronchoscope to ventilation equipment circuits.

(7) *Automatic aspirator (fig 1-8).* The automatic aspirator provides a connector for an auxiliary suction apparatus, guides the biopsy forceps into the channel, and supports the introduction of medication or lavage into the channel.

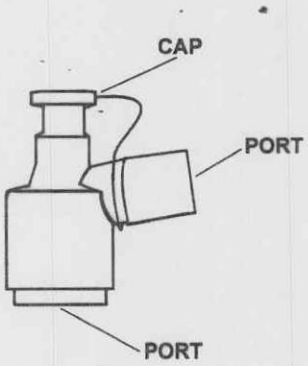

Figure 1-7. Adapter.

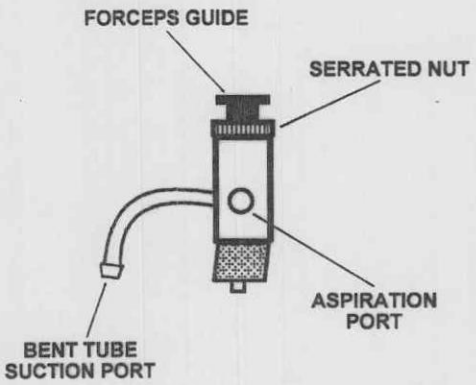

Figure 1-8. Automatic aspirator.

(8) *Cleaning brush (fig 1-9).* The cleaning brush is used for cleaning the channel.

(9) *Protective plug (fig 1-10).* The rubber protective plug is used to close the channel entry port during storage.

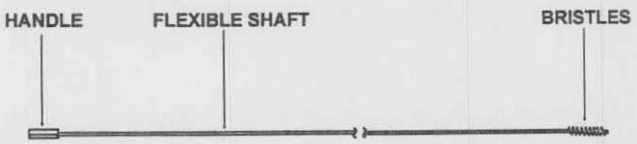

Figure 1-9. Cleaning brush.

Figure 1-10. Protective plug.

b. Accessories.

(1) *Cytology brush (fig 1-11).* The cytology brush includes an external plastic sheath to protect a cytological specimen while it is pulled through the channel of the fiberoptic bronchoscope.

(2) *Bite protector (fig 1-12).* A plastic bite protector, placed into a patient's mouth during bronchoscopic procedures, will prevent the patient from inadvertently biting the shaft.

(3) *Tracheal tube (fig 1-13).* A tracheal tube is furnished for use, if necessary, during bronchoscopic procedures.

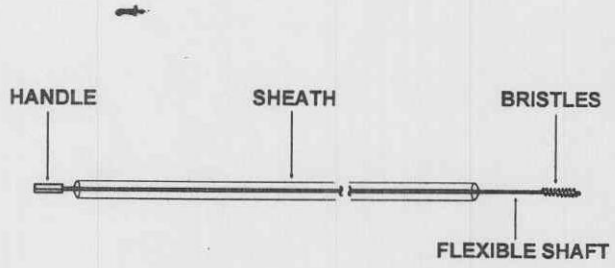

Figure 1-11. Cytology brush.

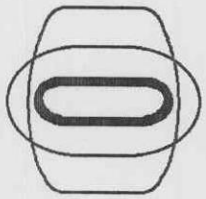

Figure 1-12. Bite protector.

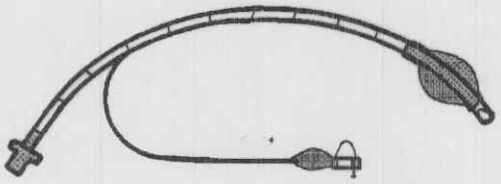

Figure 1-13. Tracheal tube.

1-13. Tabulated data, decals, and data plates.

The tabulated data provides miscellaneous characteristics, specifications, and other information for the fiberoptic bronchoscope.

a. Miscellaneous characteristics and specifications. Table 1-2 provides a broad range of miscellaneous characteristics and specifications common to both models (F3 and F3G). Table 1-3 provides characteristics unique to each model.

Table 1-2. Common characteristics and specifications.

Case dimensions	
Height	10.2 cm (4 in)
Width	55.9 cm (22 in)
Depth	38.1 cm (15 in)
Optical properties	
Vision field	67 degrees wide field, forward looking
Focus	Fixed
Suction range (permissible)	0 - 508 mm/Hg (0 - 20 in/Hg)

Table 1-2. Common characteristics and specifications - continued.

Sterilization parameters (maximum)	
Temperature	60°C (140°F)
Pressure	5 psi
Vacuum	508 mm/Hg (20 in/Hg)
Shaft working length	60 cm (23.6 in)
Shaft diameter	5.3 mm (0.21 in)
Distal tip diameter	5.0 mm (0.19 in)
Tip deflection	220 (160/60) degrees
Storage temperature range	-4°C to 60°C (30°F to 140°F)

Table 1-3. Model unique characteristics and specifications.

Physical/optical properties	*F3*	*F3G*
Focal depth	3 mm to infinity	9 mm to infinity
Eyepiece magnification	16X	20X
Channel diameter	1.8 mm (0.071 in)	2.0 mm (0.079 in)
Deflection section		
Length	31.75 mm (1.25 in)	35.8 mm (1.41 in)
Bend radius	5.08 mm (0.2 in)	10.0 mm (0.04 in)
Illumination ports	1	2

b. Identification, instruction, and warning plates, decals, or markings.

(1) The fiberoptic bronchoscope manufacturer data plate for each model (located on the proximal housing) is depicted in figure 1-14 and figure 1-15.

Figure 1-14. Manufacturer data plate (model F3).

Figure 1-15. Manufacturer data plate (model F3G).

(2) A case data plate for each model (located on the top outside lid of the case) is depicted in figure 1-16 and figure 1-17.

Figure 1-16. Case data plate (model F3).

Figure 1-17. Case data plate (model F3G).

1-14. Model differences.

Model unique characteristics and specifications are identified in the preceding table 1-3. Model differences are also illustrated in figure 2-5. End item component differences are identified in appendix C.

1-15. Safety, care, and handling.

a. Observe each WARNING, CAUTION, and NOTE in this manual.

b. Read the operating instructions in this manual before using the unit. The fiberoptic bronchoscope is intended for use by qualified surgeons only. Refer servicing to a qualified Medical Equipment Repairer.

c. Fiberoptic bronchoscopy is a diagnostic and therapeutic technique. It is a safe modality when used by experienced and prudent surgeons who are trained and aware of the potential hazards, limitations, and patient complications.

d. Excessive suction may cause edema and trauma. It should be limited to the vacuum range specified in table 1-2.

e. Fiberoptic bronchoscopes require special care and attention to their care and handling. The fiberoptic bundles consist of approximately 32,000 individual glass fibers which readily break. The fiberoptic bronchoscope also contains parts which move relative to other parts and wear out by friction based upon use. Deflection of the shaft increases friction between parts and hence increases wear.

Section III. PRINCIPLES OF OPERATION

1-16. Basic operation.

a. The fiberoptic bronchoscope consists of a high impact plastic proximal housing, a flexible shaft, a light carrier cable attached to the housing, and a connector for an automatic aspirator.

b. The proximal housing is designed for holding with the left hand and includes the eyepiece, the controls for tip manipulation and suction, the control for ocular diopter adjustment, and access to the channel.

c. The shaft contains the channel and two types of fiberoptic bundles. One bundle transmits light from the endoscopic instrument light source to the distal tip of the fiberoptic bronchoscope for illumination of the viewing area. The other bundle returns the reflected light through an objective lens to the eyepiece.

NOTE

The model F3G fiberoptic bronchoscope contains two light bundles to illuminate the viewing area.

d. An auxiliary light source and suction apparatus support fiberoptic bronchoscopic procedures.

CHAPTER 2

OPERATING INFORMATION AND INSTRUCTIONS

Section I. PREPARATION FOR OPERATION

2-1. Scope.

This manual is primarily intended to provide information, instructions, and procedures for the maintenance of the fiberoptic bronchoscope. The operating information and instructions, while valid, do not provide sufficient information for use of the fiberoptic bronchoscope on a patient. Only qualified surgeons are trained in specific bronchoscopic techniques and procedures.

2-2. Holding the fiberoptic bronchoscope.

CAUTION

Personnel not familiar with fiberoptic instruments should never handle the fiberoptic bronchoscope to prevent damage to it.

a. Lift the fiberoptic bronchoscope out of its case by grasping the proximal housing with your left hand and removing the attached shaft and light carrier cable from the case cutouts with your right hand.

b. Position the fiberoptic bronchoscope in your left hand as depicted in figure 2-1.

NOTE

The channel entry port should be pointing upward.

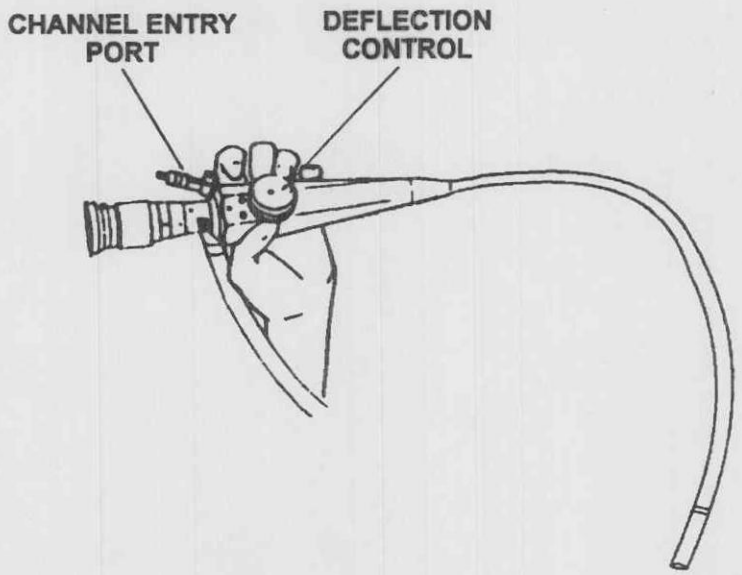

Figure 2-1. Holding the fiberoptic bronchoscope.

Section II. OPERATING INFORMATION

2-3. Controls (fig 2-2).

a. Ocular diopter control. This rotary control varies the refractive power of the fiberoptic bronchoscope viewing objective lens between +2 and -8 diopters.

b. Deflection control. This mechanical control varies the deflection of the distal tip of the fiberoptic bronchoscope through 220 degrees. A deflection control index is positioned above the control.

c. Aspiration control. This port controls aspiration by placing the pad of your forefinger over it. Removing your forefinger stops aspiration.

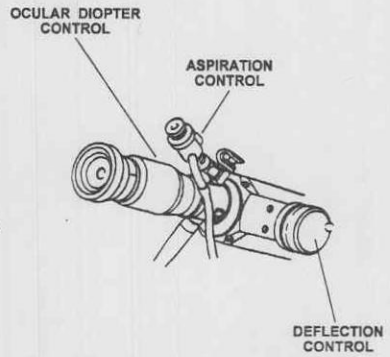

Figure 2-2. Controls.

2-4. Operational components.

a. Light carrier cable (fig 2-3). The terminal of the light carrier cable is connected to the endoscopic instrument light source in accordance with the procedures contained in the applicable technical manual for the light source.

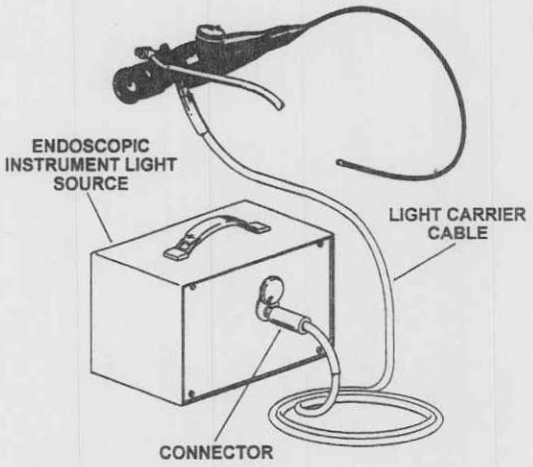

Figure 2-3. Light carrier cable.

b. Automatic aspirator (fig 2-4). The automatic aspirator attaches to the channel entry port connector. It supports the use of biopsy forceps, cytology brushes, and other diagnostic and therapeutic agents for bronchoscopic procedures. Suction for bronchoscopic procedures is also attained through the automatic aspirator and the channel entry port.

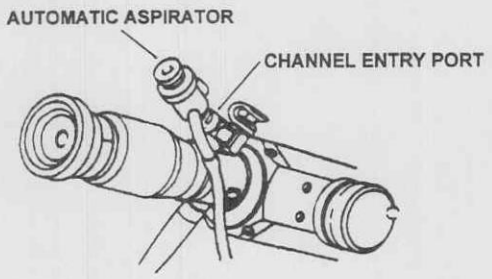

Figure 2-4. Automatic aspirator.

c. Distal tip (fig 2-5).

(1) *Illumination port(s).* Light for illumination of the viewing area travels from the endoscopic instrument light, through the light carrier cable and light bundle(s), and out the illumination port(s).

NOTE

The model F3 fiberoptic bronchoscope has one illumination port and the model F3G has two illumination ports.

(2) *Objective lens.* The objective lens provides a wide field of view to reflect the light from the illumination port(s) to the eyepiece.

(3) *Channel outlet.* Biopsy forceps, cytology brushes, and other diagnostic and therapeutic agents entering the fiberoptic bronchoscope through the automatic aspirator exit through the channel outlet.

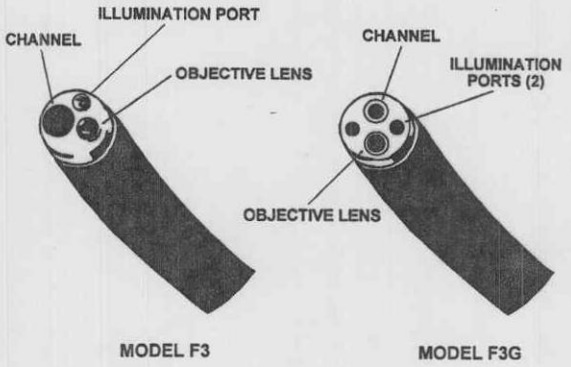

Figure 2-5. Distal tip.

Section III. OPERATING INSTRUCTIONS

2-5. Initial start-up procedures.

a. Open the case by pulling the two latches forward. Then, lift the lid of the case upward on its hinges until fully open.

b. Inspect the case and contents for damage.

CAUTION

Personnel not familiar with fiberoptic instruments should never handle the fiberoptic bronchoscope to prevent damage to it.

c. Remove the fiberoptic bronchoscope, components, and accessories from the case.

d. Perform the operational tests contained in paragraph 3-8.

e. Connect the light carrier cable to the endoscopic instrument light source (fig 2-6) in accordance with the procedures contained in the applicable technical manual for the light source.

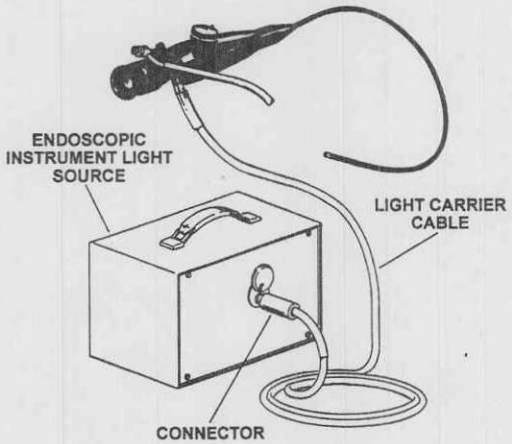

Figure 2-6. Connection to a light source.

f. Install the automatic aspirator (fig 2-7) as follows:

(1) Grasp the proximal housing of the fiberoptic bronchoscope in your left hand. The eyepiece will be pointing at your body.

(2) Grasp the automatic aspirator between the thumb and forefinger of your right hand with the bent suction tube pointing toward the left side of the proximal housing.

(3) Push the automatic aspirator onto the Luer fitting and rotate the automatic aspirator clockwise until it is finger tight. The bent suction tube will now be pointing toward the right side of the proximal housing.

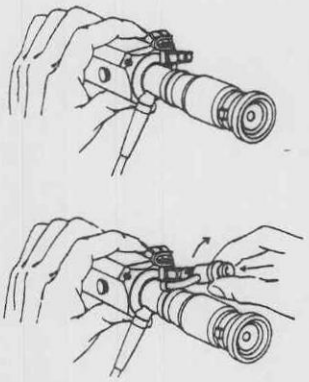

Figure 2-7. Installing the automatic aspirator.

CAUTION

Do not excessively tighten the automatic aspirator onto the Luer fitting to prevent damage to it.

g. Prepare the auxiliary suction apparatus for operation in accordance with its technical manual or manufacturer's information.

h. Attach suction tubing to the end of the bent tube on the automatic aspirator. Refer to figure 2-8.

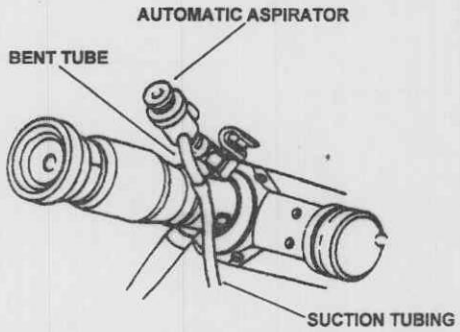

Figure 2-8. Attaching suction tubing.

2-6. Routine start-up procedures.

Routine start-up procedures vary only insofar as the sterility of the fiberoptic bronchoscope, its components and accessories, and the surgical environment.

2-7. Operating hints.

a. The integrity of the channel will be maintained in an optimum condition by using the proper technique with the biopsy forceps, cytology brushes, cleaning brush, or flexible test gauge. This is accomplished by grasping the instrument shaft about four centimeters (1.5 inches) from its end and gently pushing the instrument shaft into the forceps guide of the automatic aspirator until your fingers touch the guide. Repeat these short strokes until the instrument is in the desired position.

b. The channel offers the least resistance to instruments when it is straight. Resistance increases as the angle of tip deflection increases. Use of the biopsy forceps with a tip deflection angle greater than 60 degrees in any direction will contribute to channel damage.

c. A lubricated channel will reduce the friction during passage of the biopsy forceps. Operational lubrication procedures are as follows:

(1) Insert the biopsy forceps into the channel through the automatic aspirator until it protrudes at least 5 centimeters (2 inches) from the distal end of the fiberoptic bronchoscope.

(2) Apply silicone fluid (fig 2-9).

(3) Retract the biopsy forceps slowly in small increments with a pulling-and-pushing motion to coat the channel.

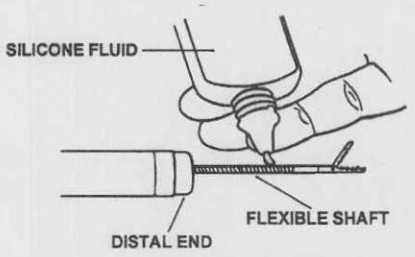

Figure 2-9. Channel lubrication.

d. Exposure to x-radiation degrades the optical image and light carrier fiberoptic bundles. Such exposure should be minimized consistent with effective bronchoscopic procedures.

e. The fiberoptic bronchoscope has specifically designed biopsy forceps. Biopsy forceps for other models or manufacturers of endoscopic instruments should not be used.

2-8. Aspiration (fig 2-10).

NOTE

The auxiliary suction apparatus has been previously set up for operation and connected to the automatic aspirator. Refer back to paragraph 2-5f.

a. Place the pad of your forefinger over the aspiration port to obtain suction.

b. Adjust the suction apparatus, as necessary, to obtain the desired level of suction.

c. Remove your finger from the aspiration port to stop suction.

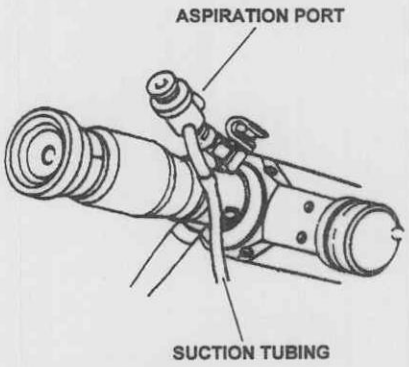

Figure 2-10. Aspiration.

2-9. Medication or lavage use (fig 2-11).

a. Fill a syringe with the desired medication or lavage fluid.

b. Place the blunt needle from the aspirator assembly (a component of the automatic aspirator kit) onto the syringe.

c. Insert the blunt needle into the forceps guide and then depress the forceps guide with the syringe while simultaneously depressing the syringe plunger.

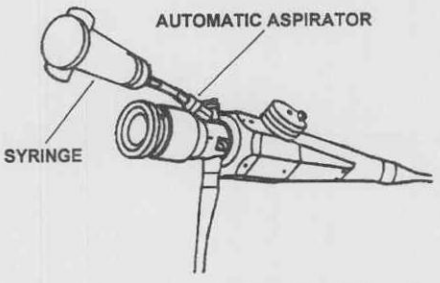

Figure 2-11. Use of medication or lavage.

NOTE

The automatic aspirator will shut off when the syringe plunger is depressed, as described in subparagraph c above.

2-10. Cytological specimens (fig 2-12).

The disposable, sleeved cytology brush is designed to obtain specimens which must be protected from contamination by an external plastic sheath.

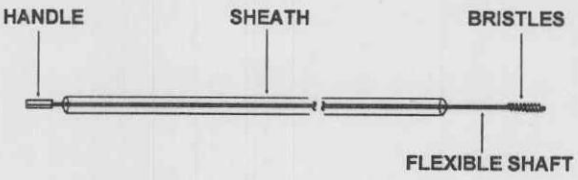

Figure 2-12. Cytology brush.

a. Initial procedures (prior to insertion into the channel).

(1) Remove the cytology brush from its sheath.

(2) Reinsert the brush end of the cytology brush into its sheath until the brush tip is flush with the distal end of its sheath.

CAUTION

When the brush is pushed past the distal end of its sheath and then retracted back into the sheath, subsequent extension of the brush will not be possible due to the bristle orientation. You must repeat procedures (1) and (2) above to correct the problem.

b. Operational procedures.

(1) Reduce the deflection of the fiberoptic bronchoscope shaft to less than a 100-degree angle.

(2) Insert the sheathed cytology brush into the channel until the sheath is flush with the distal end of the fiberoptic bronchoscope.

CAUTION

Do not permit the sheathed cytology brush to protrude beyond the distal end of the fiberoptic bronchoscope until the site of brush use is observed through the eyepiece.

(3) Hold the sheath in a fixed position and push the cytology brush through its sheath until visible through the eyepiece.

(4) Position the fiberoptic bronchoscope shaft until the cytology brush is located at the desired specimen area.

(5) Obtain the specimen.

(6) Retract the cytology brush back into its sheath.

(7) Reduce the deflection of the fiberoptic bronchoscope shaft to less than a 100-degree angle.

(8) Withdraw the entire cytology brush from the channel.

(9) Remove the fiberoptic bronchoscope from the patient or hold it in position if further examination is necessary.

2-11. Shutdown procedures.

Shutdown procedures are as follows:

a. Disconnect the suction tubing from the bent tube on the automatic aspirator. Refer to figure 2-13.

b. Shut down the auxiliary suction apparatus in accordance with the procedures in its technical manual or manufacturer's information.

c. Rotate the automatic aspirator counterclockwise until it meets a slight resistance and then pull it upward off the Luer fitting. Set it aside for subsequent cleaning and sterilization.

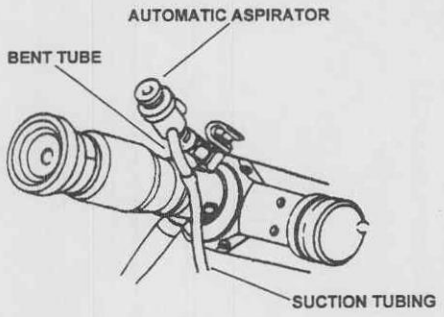

Figure 2-13. Removing suction tubing.

d. Disconnect the light carrier cable from the endoscopic instrument light source.

e. Shut down the light source in accordance with the procedures in its technical manual or manufacturer's information.

f. Perform the necessary cleaning and sterilizing procedures in accordance with chapter 2, section V, of this manual.

Section IV. OPERATION OF AUXILIARY EQUIPMENT

2-12. Associated support items of equipment.

The fiberoptic bronchoscope requires multiple support items of equipment for operation. These support items include the following:

a. Suction apparatus, surgical.

b. Sterilizer.

c. Light, endoscopic instrument, fiberoptic.

d. Generator, electrical power (shared with multiple items of surgical equipment).

2-13. Associated material.

Associated material is identified in appendix D and appendix E.

Section V. CLEANING, DISINFECTING, AND STERILIZING PROCEDURES

2-14. General.

a. Personal protective equipment (including goggles, mask, gloves, and gown or other suitable clothing) will be worn by personnel cleaning and sterilizing the fiberoptic bronchoscope.

b. Accessories identified as disposable will not be cleaned and reused. These accessories were designed and manufactured for only one use.

2-15. Biopsy forceps.

a. Cleaning.

(1) Rinse the biopsy forceps in running water to remove any debris or mucus.

(2) Use a small bristled brush (toothbrush) to thoroughly clean the forceps in warm, soapy water. Give special attention to the jaw cups and their delicate mechanisms.

(3) Rinse the biopsy forceps in running water.

b. Disinfecting.

(1) Wipe the biopsy forceps with disinfectant solution.

(2) Wipe the biopsy forceps with a sterile 4-inch by 4-inch gauze pad saturated with 50 percent alcohol.

(3) Wipe the biopsy forceps with sterile water using a sterile 4-inch by 4-inch gauze pad.

(4) Dry the biopsy forceps with a sterile towel.

(5) Wrap and store the biopsy forceps in accordance with standard unit procedures.

c. Sterilizing. Sterilize the biopsy forceps, as necessary, with the fiberoptic bronchoscope. Refer to paragraph 2-17c.

2-16. Automatic aspirator (fig 2-14).

a. Cleaning.

(1) Unscrew the serrated nut by turning it counterclockwise. Set it aside.

(2) Pull the forceps guide assembly out of the automatic aspirator housing. Set it aside.

(3) Remove the spring. Set it aside.

(4) Wash all components and the automatic aspirator housing in warm, soapy water to remove all debris. Use a soft, flexible device (pipe cleaner) to clean inside the bent tube and the aspirator port.

(5) Rinse in clean water.

(6) Reassemble the automatic aspirator.

b. Disinfecting. Rinse the automatic aspirator with disinfectant solution and then rinse it with 50 percent alcohol.

c. Sterilizing. Sterilize the automatic aspirator, as necessary, with the fiberoptic bronchoscope. Refer to paragraph 2-17c.

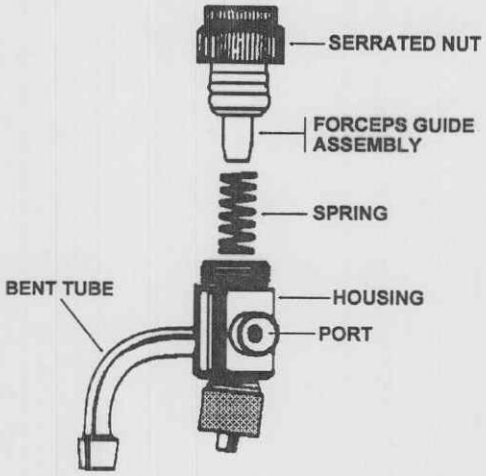

Figure 2-14. Automatic aspirator cleaning.

2-17. Fiberoptic bronchoscope.

a. Cleaning.

(1) Ensure that the suction tubing and light source are disconnected from the fiberoptic bronchoscope.

(2) Squirt approximately 30 milliliters of water through the channel using a 50-milliliter syringe.

(3) Wipe the fiberoptic bronchoscope shaft with a sterile 4-inch by 4-inch gauze pad saturated with sterile water. Wipe downward from the proximal housing to the distal tip.

(4) Insert the cleaning brush into the channel and push it through the entire channel while simultaneously rotating the brush in a circular motion.

(5) Clean any debris or mucus from the brush bristles with warm, soapy water and a bristled brush.

(6) Draw the cleaning brush back through the channel while rotating it in a circular motion.

(7) Clean any debris or mucus from the brush bristles with warm, soapy water and a bristled brush.

(8) Repeat procedures (4) through (7) above three additional times.

b. Disinfecting.

(1) Inject approximately 5 to 8 milliliters of a disinfectant solution into the channel with a syringe.

(2) Flush out the disinfectant solution with 20 to 30 milliliters of 50 percent alcohol.

(3) Wipe the external proximal housing and shaft with disinfectant solution and IMMEDIATELY wipe it again with sterile 4-inch by 4-inch gauze pads saturated with 50 percent alcohol.

(4) Inject approximately 50 milliliters of sterile water through the channel.

(5) Wipe the external proximal housing and shaft with sterile water using sterile 4-inch by 4-inch gauze pads.

(6) Wipe the proximal housing again with 50 percent alcohol.

(7) Attach a source of oxygen to the channel inlet.

(8) Set an oxygen flow of 3 lpm and allow it to flow through the channel for approximately 10 minutes to dry it.

CAUTION

The preceding cleaning and disinfecting procedures are effective for 2 to 3 patient procedures in a given day. Experience has indicated that cultures of the outer surfaces and the channel have identified no pathogens. However, bacteriological cultures for acid-fast bacilli, pathogens, and spore bearing organisms should be completed periodically. Disinfectant solutions will not kill aspergillosis organism spores, anaerobic bacteria, or tubercle bacilli. Destroy these organisms with ethylene oxide (EtO) sterilization.

c. Sterilizing (EtO only).

(1) Place the fiberoptic bronchoscope and components/accessories for the next bronchoscopic procedure into either a towel sealed with masking tape or into its case.

(2) Follow the instructions from the sterilizer manufacturer but DO NOT EXCEED the following sterilization parameters.

(a) Vacuum - 20 in/Hg.

(b) Pressure - 5 psi.

(c) Temperature - 60°C (140°F).

(3) Aerate the fiberoptic bronchoscope.

WARNING

The fiberoptic bronchoscope must be aerated for 7 days after it is sterilized.

Section VI. OPERATION UNDER UNUSUAL CONDITIONS

2-18. General.

The fiberoptic bronchoscope is a delicate precision instrument that can only be used in a controlled environment. It cannot operate under unusual conditions.

2-19. Operating/storing temperature range.

The fiberoptic bronchoscope should only be operated or stored within the temperature range of -4°C (30°F) to 60°C (140°F).

CHAPTER 3

UNIT LEVEL MAINTENANCE

Section I. GENERAL INFORMATION

3-1. Overview.

a. Unit level maintenance. This level of maintenance is the responsibility of and performed by a using unit on its assigned equipment. Responsibilities are stratified as follows:

(1) *Operator maintenance.* This segment of unit level maintenance is performed by operator/user personnel and consists of equipment operational functions; routine services like cleaning, dusting, washing, checking for frayed cables, and stowing items not in use; and checking for loose hardware, replacing operator accessories, and replacing operator repair parts. Replacing operator parts will not require extensive disassembly or assembly of the end item, critical adjustments after replacement, or the extensive use of tools.

(2) *Specialist maintenance.* This segment of unit level maintenance is performed only by trained Medical Equipment Repairers. The functions and services include—

(a) Scheduling and performing PMCS, electrical safety inspections and tests, and calibration/verification/certification (CVC) services.

(b) Performing unscheduled maintenance functions with emphasis on replacing assemblies, modules, and PCBs, when available.

(c) Operating a repair parts program to include Class VIII repair parts as well as other commodity class repair parts used on medical equipment.

(d) Maintaining a library of technical manuals (TMs), manufacturers' literature, repair parts information, and related materials.

(e) Conducting inspections on new or transferred equipment.

(f) Establishing administrative procedures for the control and administration of maintenance services in accordance with TB 38-750-2.

(g) Notifying support maintenance battalions of requirements and/or evacuating unserviceable equipment, assemblies, or modules.

b. Maintenance functions. Maintenance functions, both preventive and corrective, which are beyond the scope of the operator/user are assigned to unit level Maintenance Equipment Repairer personnel. These personnel will perform the majority of maintenance required for the equipment.

3-2. Tools and test equipment.

Common tools and test equipment required for unit level maintenance of the equipment are listed in appendix B, section III of this manual. Refer to your unit's modified table of organization and equipment (MTOE) for authorized items.

3-3. Components of end item and basic issue items.

Components of end item and basic issue items are listed in appendix C, sections II and III of this manual.

3-4. Expendable supplies.

Expendable and durable supplies and materials required for maintenance of the equipment are listed in appendix D, section II of this manual.

3-5. Repair parts.

Repair parts required for unit level maintenance are listed in appendix E, section II of this manual.

3-6. Special tools.

Special tools required for unit level maintenance of the equipment are listed in appendix E, section III of this manual.

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

3-7. Unpacking the fiberoptic bronchoscope.

a. Open the cardboard shipping carton.

b. Remove the fiberoptic bronchoscope using the handle of the case.

c. Open the case by pulling the two latches forward. Then, lift the lid of the case upward on its hinges until fully open.

d. Inspect the case and contents for damage.

e. Observe how the components and accessories are packed into the case (fig 3-1). The numbered callouts of the components and accessories correspond to the numbered cutouts.

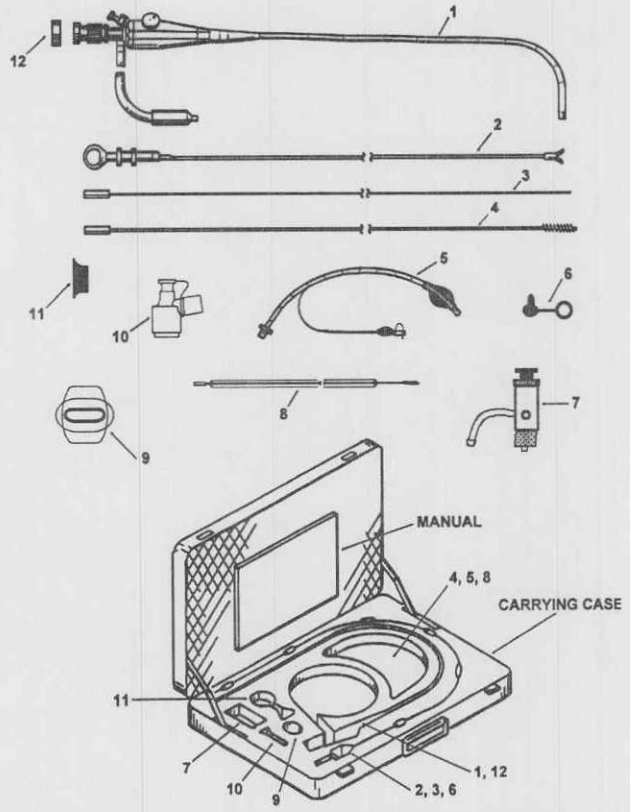

Figure 3-1. Components and accessories.

f. Verify receipt of the following:

(1) Case.

(2) Fiberoptic bronchoscope.

(3) Cleaning brush.

(4) Tracheal tube.

(5) Operation and maintenance manual, 2 each.

(6) Cytology brushes, 5 each.

(7) Eyepiece cover.

(8) Biopsy forceps.

(9) Flexible test gauge.

(10) Protective plug.

(11) Bite protector(s) (Model F3, 3 each; Model F3G, 1 each).

(12) Adapter.

(13) Rubber eyeguard.

(14) Automatic aspirator kit.

CAUTION

Personnel not familiar with fiberoptic instruments should never handle the fiberoptic bronchoscope to prevent damage to it.

3-8. Operational testing.

a. Flexible shaft and deflection section.

(1) Visually inspect the entire surface of the flexible shaft and deflection section for dents, protrusions, holes, or other irregularities.

(2) Pass the entire flexible shaft and deflection section between your thumb and forefinger as illustrated in figure 3-2. This procedure should be accomplished while the shaft is both straight and fully deflected to check for any metallic protrusions or other irregularities.

(3) Grasp both ends of the deflection section and pull outward with your fingers as illustrated in figure 3-3. No perceptible elongation of the deflection section should occur at the point indicated by the arrow in the illustration.

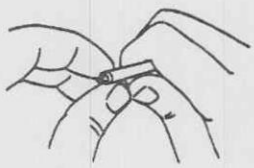

Figure 3-2. Testing the flexible shaft.

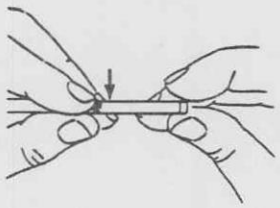

Figure 3-3. Testing the deflection section.

(4) Operate the deflection control knob in the ratchet free mode to both extremes (up and down) while feeling the deflection section with your fingers. The deflection section should be free of any roughness, excessive looseness, or clicking of the control mechanism.

CAUTION

Do not force the deflection section further than provided by the deflection control knob while examining it with your fingers.

b. Deflection control.

(1) Hold the fiberoptic bronchoscope in your left hand as illustrated in figure 3-4.

CAUTION

Do not allow the distal end of the flexible shaft to strike any object to prevent damage.

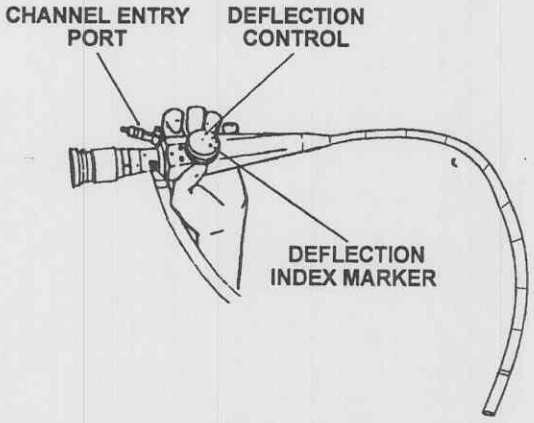

Figure 3-4. Deflection control.

(2) Pull upward on the deflection control knob to disengage the ratchet mode of operation.

(3) Grasp the flexible shaft with your right hand about 3 inches from the distal end and rotate the fiberoptic bronchoscope to a horizontal position.

(4) Grasp the deflection control knob with the thumb and finger tips of your left hand and rotate it until its index is in a horizontal plane.

NOTE

The distal tip of the flexible shaft should be in a neutral (nondeflected) position.

(5) Rotate the deflection control knob clockwise until a definite "click" is felt.

NOTE

The distal tip of the flexible shaft should be deflected downward through 45 degrees and the deflection control knob index will be pointing downward.

(6) Depress the deflection control knob into the ratchet position. Then, rotate the knob counterclockwise while sensing each "click" position through 145 degrees. Return the deflection to the neutral position.

CAUTION

Avoid any additional manipulation of the flexible shaft to preclude unnecessary wear and reduction of its productive life.

NOTE

Each "click" deflects the distal tip of the flexible shaft an additional 15 degrees.

c. Torque.

(1) Hold the fiberoptic bronchoscope in your left hand as illustrated in figure 3-5.

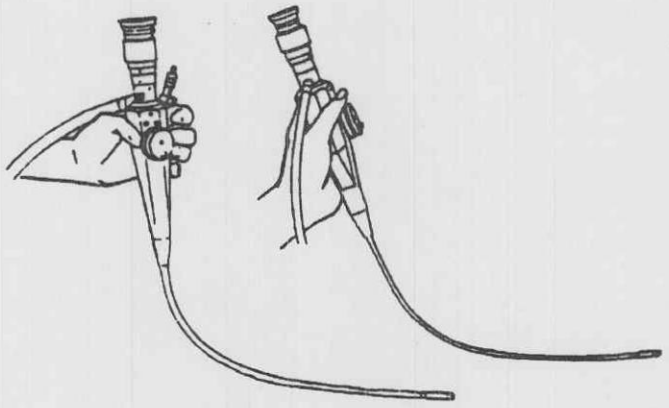

Figure 3-5. Torque test.

(2) Rotate the fiberoptic bronchoscope 90 degrees.

NOTE

The distal tip of the flexible shaft should also rotate 90 degrees.

d. Illumination.

(1) Connect the light carrier cable to the endoscopic instrument light source and turn it on in accordance with the procedures contained in the applicable technical manual or manufacturer's information for the light source.

(2) Cup your fingers around the distal end of the flexible shaft to form a tunnel as shown in figure 3-6. Examine the entire visual field for uniform illumination.

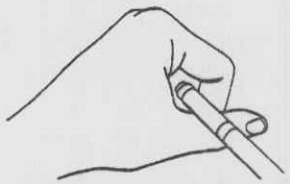

Figure 3-6. Illumination test.

e. Channel integrity.

(1) Remove the flexible test gauge from its circular plastic housing.

(2) Grasp the flexible test gauge about four centimeters (1.5 inches) from its end and gently push it into the forceps guide of the automatic aspirator until your fingers touch the guide.

(3) Repeat these short strokes until the flexible test gauge is completely into the channel while being attentive to any increased friction.

(4) Remove the flexible test gauge by pulling it out of the channel in short four centimeter strokes while being attentive to any increased friction.

(5) Reinsert the flexible test gauge back into its circular plastic housing and then place it back into the case.

Section III. LUBRICATION INSTRUCTIONS

3-9. General.

a. No conventional lubrication of the fiberoptic bronchoscope is required.

b. Operational lubrication of the working channel, as necessary, will be accomplished by qualified medical personnel. Refer back to paragraph 2-7c.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-10. General.

a. The fiberoptic bronchoscope must be inspected and serviced systematically to ensure that it is ready for operation at all times. Inspection will allow defects to be discovered and corrected before they result in serious damage or failure.

b. Table 3-1 contains a list of items to be performed by unit level operator/user personnel. This PMCS table is also referred to as "-10 PMCS" requirements. Preventive maintenance by operator/user personnel is not limited to performing the checks and services in table 3-1. There are things operator/user personnel should do any time they need to be done, such as checking general cleanliness, observing for improper operational indicators, and maintaining the proper quantities of accessories.

c. Table 3-2 contains a list of items to be performed by unit level Medical Equipment Repairers. This PMCS table is also referred to as "-20 PMCS" requirements.

d. Some items to be inspected will be listed in both table 3-1 and table 3-2 to stress their importance, to provide a quality control check on multiple operator/user personnel, and to identify more comprehensive procedures to be accomplished by unit level Medical Equipment Repairers.

e. The following is a list of both PMCS table column headings with a description of the information found in each column:

(1) *Item No.* This column shows the sequence in which to do the PMCS, and is used to identify the equipment area on the Equipment Inspection and Maintenance Worksheet, DA Form 2404.

(2) *Interval.* This column shows when each PMCS item is to be serviced: **B** - Before Operation, **D** - During Operation, **A** - After Operation, **Q** - Quarterly, and **S** - Semiannually. **B, D,** and **A** should be performed with daily use of the equipment.

NOTE

When the fiberoptic bronchoscope must be kept in continuous operation, check and service only those items that will not disrupt operation. Perform the complete daily checks and services when the equipment can be shut down.

(3) *Item to be Inspected and Procedure.* This column identifies the general area or specific part to be checked or serviced.

(4) *Equipment is not Ready/Available If:.* This column lists conditions that make the equipment unavailable or unusable.

Table 3-1. Operator preventive maintenance checks and services.

ITEM NO	INTERVAL					ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	Q	S		
1	X			X		**Fiberoptic bronchoscope.**	
						a. Verify that all components and accessories are on hand.	Missing components or accessories prevent operation.
						b. Perform all operational testing identified in paragraph 3-8 and verify compliance with test parameters.	Failure to meet test parameters prevents bronchoscopic procedures.
						c. Inspect the light carrier cable and connector for cuts, fraying, deterioration, or other physical damage.	The condition of the light carrier cable or light source connector prevents operation.
2	X			X		**Automatic aspirator.**	
						a. Verify proper operation of the aspiration function by following the procedures in paragraph 2-8.	Failure to operate in accordance with procedures hampers safe operation or prevents bronchoscopic procedures.
						b. Check the operation of the biopsy forceps guide involving routine and special procedures.	Improper operation of the biopsy forceps guide prevents bronchoscopic procedures.
3					X	**Case.**	
						a. Inspect for cracks, dents, and puncture holes.	Damaged case prevents protective storage, safe movement, or use for sterilization.
						b. Check for loose, bent, or broken latches.	Unserviceable latches prevent safe storage or movement.
4	X	X	X		X	**Biopsy forceps.**	
						a. Check for proper operation of the jaw cups for biopsy specimens.	The jaw cups do not open or close properly.
						b. Check for smooth passage of the forceps through the channel.	Channel damage prevents smooth passage of the forceps through the channel.

Table 3-2. Repairer preventive maintenance checks and services.

ITEM NO	INTERVAL B	D	A	Q	S	ITEM TO BE INSPECTED AND PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
1					X	**Fiberoptic bronchoscope.**	
						a. Verify that all components and accessories are on hand.	Missing components or accessories prevent operation.
						b. Perform all operational testing identified in paragraph 3-8 and verify compliance with test parameters.	Failure to meet test parameters prevents bronchoscopic procedures.
						c. Inspect the light carrier cable and connector for cuts, fraying, deterioration, or other physical damage.	The condition of the light carrier cable or light source connector prevents operation.
2					X	**Automatic aspirator.**	
						a. Verify operation of the suction function by following the procedures in paragraph 2-8.	Failure to operate in accordance with specified procedures hampers safe operation or precludes bronchoscopic procedures.
					X	*b.* Check the operation of the biopsy forceps guide.	Improper operation of the biopsy forceps guide prevents bronchoscopic procedures.
3					X	**Case.**	
						a. Inspect for cracks, dents, puncture holes, or other physical damage.	Damage or wear of the case prevents protective storage or safe movement.
						b. Check for loose, deformed, broken, or missing latches.	Unserviceable latches prevent safe storage or movement.
						c. Verify the functional integrity of the protective foam insert.	Unserviceable foam cutouts prevent safe storage or movement.

3-11. Reporting deficiencies.

Operator personnel will report problems with the fiberoptic bronchoscope discovered during their "-10 PMCS" that they are unable to correct. Refer to TB 38-750-2 and report the deficiency using the proper forms. Consult with your unit Medical Equipment Repairer if you need assistance.

Section V. TROUBLESHOOTING

3-12. General.

a. Troubleshooting information for the fiberoptic bronchoscope is minimal because of the precision of the mechanical mechanisms and lack of the tools, support equipment, and training for the repair of fiberoptic instruments.

b. This manual cannot list all possible malfunctions. If a malfunction is either not listed or is not determined by routine diagnostic procedures, notify your appropriate maintenance support unit.

3-13. Troubleshooting.

Troubleshooting procedures are provided in table 3-3. Each symptom is followed by possible causes and corrective actions.

Table 3-3. Troubleshooting.

SYMPTOM POSSIBLE CAUSE CORRECTIVE MAINTENANCE
1. NO LIGHT FROM ILLUMINATION PORT.
Defective endoscopic instrument light source.
Repair the endoscopic instrument light source in accordance with its technical manual or manufacturer's information.
Defective light carrier cable or connector.
Return the complete fiberoptic bronchoscope to a depot level maintenance activity and request replacement.
2. SUCTION INOPERATIVE OR INEFFECTIVE.
Suction tubing not connected to automatic aspirator.
Connect suction tube.
Suction apparatus inoperative.
Repair the suction apparatus in accordance with its technical manual or manufacturer's information.
Automatic aspirator defective.
Repair automatic aspirator. Refer to paragraph 3-15.
3. INEFFECTIVE OPERATION OF A COMPONENT.
Defective or worn component.
Replace the component.
4. OPERATIONAL TESTS INDICATE PROBLEMS.
Improper handling, misuse, or wear.
Return the complete fiberoptic bronchoscope to a depot level maintenance activity and request replacement.

Section VI. REPAIR PROCEDURES

3-14. General.

a. Repair procedures for the fiberoptic bronchoscope are very limited because of the high precision tools and support equipment required to make repairs and the manufacturer's controls on the availability of repair parts.

b. Procedures for disassembly, repair, or replacement of components are provided in this section of the manual.

c. Repair procedures are continuous from the first disassembly to the final reassembly step.

3-15. Automatic aspirator.

a. Disassembly.

(1) Remove the automatic aspirator from the fiberoptic bronchoscope by rotating it counterclockwise until it meets a slight resistance and then pull it upward off the Luer fitting.

NOTE

Refer to figure 3-7 for the next two steps.

(2) Unscrew the serrated nut and pull the forceps guide assembly from the automatic aspirator housing. Set it aside.

(3) Remove the spring. Set it aside.

NOTE

Refer to figure 3-8 for the next three steps.

(4) Unscrew the forceps guide from the serrated nut. Set them aside.

(5) Remove the seal by pushing a thin wire through the center hole in the adapter stem. Discard the seal.

(6) Remove and discard the O-ring from the adapter stem.

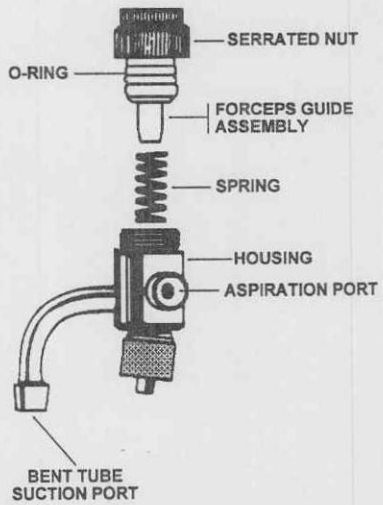

Figure 3-7. Automatic aspirator disassembly.

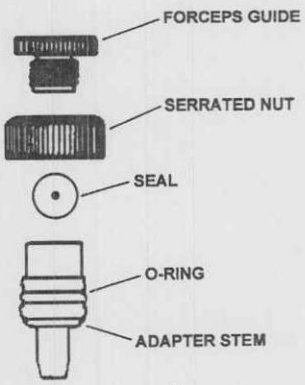

Figure 3-8. Adapter stem disassembly.

b. Assembly.

(1) Install a replacement O-ring.

(2) Install a replacement seal onto the adapter stem with the side of the seal containing the small hole pointing upward.

(3) Assemble the adapter stem, serrated nut, and forceps guide as illustrated in figure 3-8 and screw the forceps guide into the adapter stem.

NOTE

Ensure that the threads on the serrated nut are facing downward.

(4) Assemble the automatic aspirator housing, spring, and forceps guide assembly as illustrated in figure 3-7 and screw the serrated nut onto the housing.

NOTE

The side of the seal with the small hole must point upward.

c. Test.

(1) Depress down on the forceps guide and then release it.

(2) Observe that the forceps guide quickly springs back to its extended position.

NOTE

Check the installation of the spring if the forceps guide does not operate properly.

Section VII. STORING AND SHIPPING PROCEDURES

3-16. General.

This section contains the procedures for preparing the fiberoptic bronchoscope for storing or shipping.

3-17. Preparation for storing.

a. Disconnect the suction tubing from the bent tube on the automatic aspirator. Refer back to figure 2-13.

b. Shut down the auxiliary suction apparatus in accordance with the procedures in its technical manual or manufacturer's information.

c. Rotate the automatic aspirator counterclockwise until it meets a slight resistance and then pull it upward off the Luer fitting. Set it aside for subsequent cleaning and sterilization.

d. Disconnect the light carrier cable from the endoscopic instrument light source.

e. Shut down the light source in accordance with the procedures in its technical manual or manufacturer's information.

f. Perform the necessary cleaning and sterilizing procedures in accordance with chapter 2, section V of the manual.

g. Inventory the components and accessories. Replace all unserviceable or missing items.

h. Repack the fiberoptic bronchoscope and all components and accessories into the case. Refer to figure 3-9 for placement of components and accessories.

i. Swing the lid of the case down to close it and then fasten the two latches.

j. Place the fiberoptic bronchoscope into a storage location that will preclude other heavy containers from damaging it.

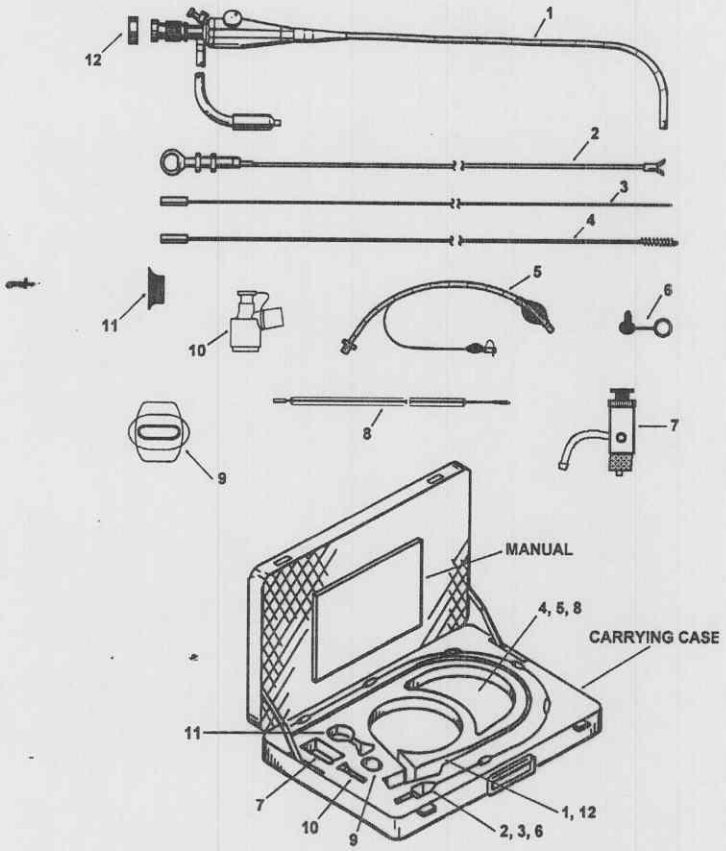

Figure 3-9. Components and accessories.

CAUTION

Ensure that the storage temperature for the fiberoptic bronchoscope remains within the range of -4°C (30°F) to 60°C (140°F).

3-18. Preparation for shipping.

a. The fiberoptic bronchoscope, properly stored within its case, is suitable for shipping in a heavy cardboard shipping carton.

b. Notify your unit transportation point for assistance, if necessary.

CHAPTER 4

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

Section I. GENERAL INFORMATION

4-1. Overview.

This chapter provides for maintenance that is beyond the capability, capacity, and authorization for unit level maintenance personnel. The procedures in this chapter will not be attempted at the unit level.

4-2. Tools and test equipment.

Common tools and test equipment required for support maintenance of the equipment are listed in appendix B, section III. Refer to your unit's MTOE or installation table of distribution and allowances (TDA) for authorized items.

4-3. Components of end item and basic issue items.

Components of end item and basic issue items are listed in appendix C, sections II and III.

4-4. Expendable supplies.

Expendable and durable supplies and materials for support maintenance are listed in appendix D, section II.

4-5. Repair parts.

Repair parts required for support maintenance are listed in appendix E, section II.

4-6. Special tools.

Special tools required for support maintenance are listed in appendix E, section III.

Section II. MAINTENANCE PROCEDURES

4-7. General.

a. There are no specific troubleshooting procedures for these levels of maintenance.

b. Repair procedures, except those identified in section VI, chapter 3, for the fiberoptic bronchoscope are beyond DS and GS levels of maintenance.

APPENDIX A

REFERENCES

A-1. Army regulations.

AR 40-61	Medical Logistics Policies and Procedures
AR 710-2	Supply Policy Below the Wholesale Level
AR 725-50	Requisitioning, Receipt, and Issue System

A-2. Technical manual.

TM-DPSC-6500-RPL	Medical Materiel: Medical Repair Parts Reference List

A-3. Technical bulletins.

TB MED 7	Maintenance Expenditure Limits for Medical Materiel
TB 8-6500-MPL	Mandatory Parts List for Medical Equipment
TB 38-750-2	Maintenance Management Procedures for Medical Equipment
TB 740-10/DLAM 4155.5/AFR 67-43	Quality Control, Depot Storage Standards, Appendix M, Medical Supplies

A-4. Field manual.

FM 21-11	First Aid for Soldiers

A-5. Supply bulletin.

SB 8-75-( )-series	Army Medical Department Supply Information

A-6. Other publications.

(These publications may be obtained from Commander, U.S. Army Medical Materiel Agency, ATTN: SGMMA-M, Frederick, MD 21702-5001.)

Operation and Maintenance Manual, Model F3, Publication Number 99-0229, CIRCON ACMI 300 Stillwater Avenue, Stamford, CT 06904-1971.

Operation and Maintenance Manual, Model F3G, Publication Number 99-0229 R2, CIRCON ACMI, 300 Stillwater Avenue, Stamford, CT 06904-1971.

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance levels.

c. Section III lists the tools and test equipment required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions, explanatory notes, and/or illustrations required for a particular maintenance function.

B-2. Explanation of columns in section II.

a. Group Number, Column 1. The assembly group number (Group No.) column is a numerical group assigned to each assembly. The applicable assembly groups are listed in the maintenance allocation chart (MAC) in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.

b. Assembly Group, Column 2. This column contains a brief description of the components of each assembly group.

c. Maintenance Functions, Column 3. This column lists the various maintenance functions (A through K) and indicates the lowest maintenance level authorized to perform these functions. The symbol designations for the various maintenance levels are as follows:

C - Operator or crew

O - Unit maintenance

F - Direct support maintenance

H - General support maintenance

D - Depot maintenance

The maintenance functions are defined as follows:

A - Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B - Test. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C - Service. To clean, to preserve, to charge, and to add lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

D - Adjust. To rectify to the extent necessary to bring into proper operating range.

E - Align. To adjust specified variable elements of an item to bring it to optimum performance.

F - Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G - Install. To set for use in an operational environment such as tents or International Standards Organization shelters.

H - Replace. To replace unserviceable items with serviceable like items.

I - Repair. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage to a specific failure. Repair may be accomplished at each level of maintenance.

J - Overhaul. Normally the highest degree of maintenance performed by the Army in order to minimize time work in process consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by a maintenance standard in technical publications for each item of equipment. Overhaul normally does not return an item to like new condition.

K - Rebuild. The highest degree of material maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance level.

d. Tools and Equipment, Column 4. This column is provided for referencing by code, the tools and test equipment (sec III) required to perform the maintenance functions.

e. Remarks, Column 5. This column is provided for referencing by code, the remarks (sec IV) pertinent to the maintenance functions.

B-3. Explanation of columns in section III.

a. Reference Code; Column 1. This column correlates to section II, column 4.

b. Maintenance Level, Column 2. This column identifies the maintenance levels using the tools and test equipment.

c. Nomenclature, Column 3. This column identifies the tools and test equipment.

d. National Stock Number, Column 4. This column provides the national stock number of the specific tools or test equipment.

B-4. Explanation of columns in section IV.

a. Reference Code, Column 1. This column correlates to section II, column 5.

b. Remarks, Column 2. This column provides supplemental information or explanatory notes pertinent to the maintenance function in section II.

Section II. MAINTENANCE ALLOCATION CHART FOR FIBEROPTIC BRONCHOSCOPE

(1) GROUP NO.	(2) ASSEMBLY GROUP	(3) MAINTENANCE FUNCTIONS A	B	C	D	E	F	G	H	I	J	K	(4) TOOLS AND EQUIPMENT	(5) REMARKS
00	Fiberoptic Bronchoscope												01,02	A
	Proximal Housing	O 0.5	O 0.6						O 0.2			D 5.2		
	Flexible Shaft	O 0.2	O 0.3									D 3.0		
01	Automatic Aspirator												01,02	A
	Housing	O 0.2							O 0.1	O 0.3				
	Forceps Guide Assembly	O 0.2	O 0.1						O 0.1	O 0.3				
02	Accessories												01,02	A
	Biopsy Forceps	O 0.1				O 0.1			O 0.1			D 1.0		
	Case	O 0.2							O 0.1	O 0.3			01,02,03	A
	Flexible Test Gauge	O 0.1							O 0.1					

Section III. TOOLS AND TEST EQUIPMENT FOR FIBEROPTIC BRONCHOSCOPE

(1) REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER
01	O,F,H,D	Tool Kit, Medical Equipment Maintenance and Repair: Repairmans	5180-00-611-7923
02	O,F,H,D	Tool Kit, Medical Equipment Maintenance and Repair: Organizational	5180-00-611-7924
03	F,H	Shop Set, Maintenance Battalion	4940-00-594-6455

Section IV. REMARKS
FOR
FIBEROPTIC BRONCHOSCOPE

(1) REFERENCE CODE	(2) REMARKS
A	Tools and test equipment are listed for each assembly group.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

C-1. Scope.

This appendix lists components of end item and basic issue items for the equipment to help you inventory items required for safe and efficient operation.

C-2. General.

The Components of End Item and Basic Issue Items lists are divided into the following sections.

a. Section II. Components of End Item. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the equipment in operation, to operate it, and to perform emergency repairs. Basic issue items must be with the equipment during operation and whenever it is transferred between property accounts. This manual is your authority to request or requisition basic issue items, based on MTOE authorization of the end item.

C-3. Explanation of columns.

The following provides an explanation of columns found in both listings:

a. Item Number, Column 1. This column indicates the item number assigned to the item.

b. National Stock Number, Column 2. This column indicates the national stock number assigned to the item.

c. Description, Column 3. This column indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the commercial and government entity (CAGE) code in parentheses followed by the part number.

d. Unit of Measure, Column 4. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation. These abbreviations are listed in the glossary.

e. Quantity, Column 5. This column indicates the quantity (QTY) of the item(s) provided with the equipment.

Section II. COMPONENTS OF END ITEM FOR FIBEROPTIC BRONCHOSCOPE

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) UNIT OF MEASURE	(5) QTY
1		Biopsy Forceps (02033) BF-5101	EA	1
2		Storage Stylet (Flexible Test Gauge) (02033) AUR-ST	EA	1
3		Eyeguard, Rubber (Model F3) (02033) B-91X	EA	1
		or		
		Eyeguard, Rubber (Model F3G) (02033) AE-6	EA	1
4		Automatic Aspirator (02033) 8808	KT	1
5		Adapter (02033) 625109-1	EA	1

APPENDIX D

EXPENDABLE AND DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. Scope.

This appendix lists expendable and durable supplies and materials that are required to maintain the equipment. This listing is authorization to requisition and retain the items if not otherwise authorized.

D-2. Explanation of columns.

a. Item Number, Column 1. The item number (Item No.) is sequentially assigned.

b. Level, Column 2. This column identifies the lowest level of maintenance that requires the listed item. An explanation of the alphabetical character is provided in appendix B, section I of this manual.

c. National Stock Number, Column 3. This column indicates the national stock number assigned to the item.

d. Description, Column 4. This column indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE code in parentheses followed by the part number.

e. Unit of Measure, Column 5. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by an alphabetical abbreviation. These abbreviations are listed in the glossary.

f. Quantity, Column 6. This column indicates the quantity (QTY) of the item(s) provided with the equipment.

Section II. EXPENDABLE AND DURABLE SUPPLIES AND MATERIALS LIST FOR FIBEROPTIC BRONCHOSCOPE

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) UNIT OF MEASURE	(6) QTY
1	O	8530-01-315-8453	Toothbrush (64682) 665-0679	EA	1
2	O	6840-00-782-2691	Disinfectant, Liquid, 1 GL (58536) A-A-1440	EA	1
3	O	6510-00-148-9770	Sponge Surgical (Pad, Gauze), 4 in by 4 in (32132) 2436	PG	1
4	O	6530-01-256-6240	Towel, Hospital, General Purpose (02318) 30182-240	EA	1
5	O	8030-00-860-9770	Silicone Fluid (01139) SF69-440	QT	1

APPENDIX E

REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

E-1. Scope.

This manual lists spare and repair parts, special tools, special test equipment; and other special support equipment required for the performance of unit level, direct support, general support, and depot level maintenance. It authorizes the requisitioning and issue of spare and repair parts in consonance with the MAC (app B).

E-2. General.

The Repair Parts and Special Tools List is divided into the following sections:

a. Repair Parts, Section II. A list of repair parts authorized for the performance of maintenance in figure number and item number sequence.

b. Special Tools, Test, and Support Equipment, Section III. A list of special tools, test, and support equipment authorized for the performance of maintenance.

E-3. Explanation of columns in section II.

a. Illustration, Column 1.

(1) *Figure Number.* This column indicates the figure number (FIG NO.) of the illustration on which the item is shown.

(2) *Item Number.* This column indicates the item number (ITEM NO.) used to identify each item on the illustration.

b. National Stock Number, Column 2. This column indicates the national stock number assigned to the item.

c. Description, Column 3. This column indicates the federal item name of the item. The last line for each item indicates the CAGE code in parentheses followed by the part number.

d. Unit of Measure, Column 4. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation.

e. Quantity, Column 5. This column indicates the quantity (QTY) of the item(s) to be used with or on the illustrated component, assembly, module, or end item.

E-4. Explanation of columns in section III.

a. Item Number, Column 1. This number is sequentially assigned.

b. Level, Column 2. This column identifies the lowest level of maintenance that requires the listed item. An explanation of the alphabetical character is provided in appendix B, section I of this manual.

c. National Stock Number, Column 3. This column indicates the national stock number assigned to the item.

d. Description, Column 4. This column indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE code in parentheses followed by the part number.

e. Unit of Measure, Column 5. This column indicates the unit of measure used in performing the actual operational or maintenance function. This measure is expressed by a two-character alphabetical abbreviation.

f. Quantity, Column 6. This column indicates the quantity (QTY) of the item(s) to be used with or on the illustrated component, assembly, module, or end item.

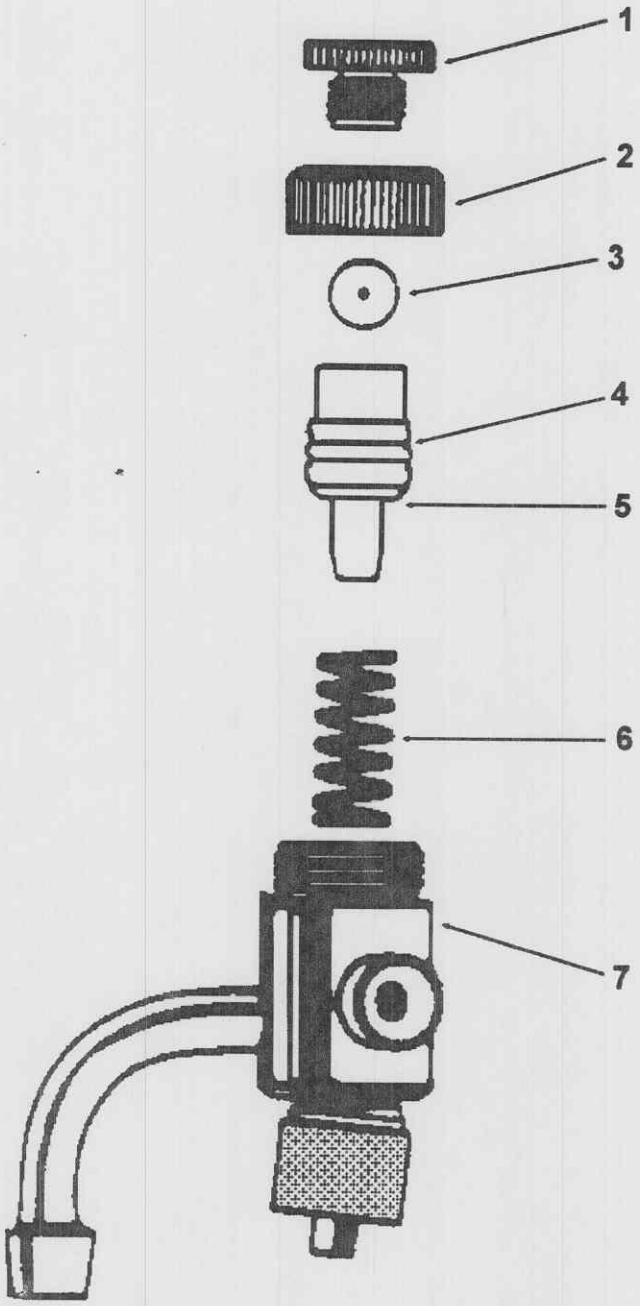

Figure E-1. Aspirator.

Section II. REPAIR PARTS LIST FOR FIBEROPTIC BRONCHOSCOPE

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
E-1	1		Forceps Guide (02033) 99-9905-13	EA	1
E-1	2		Serrated Nut (02033) 99-9905-14	EA	1
E-1	3		Seal (02033) 99-9905-8	EA	1
E-1	4		O-ring (02033) 99-9905-18	EA	1
E-1	5		Adapter Stem (02033) 99-9905-11	EA	1
E-1	6		Spring (02033) 99-9905-15	EA	1
E-1	7		Housing, Aspirator (02033) 99-9905-22	EA	1
E-1	*		Blunt Needle (02033) 8808-2-1	EA	1
E-1	**		Aspirator Assembly (02033) 8808-1	KT	1

* Indicates a part not shown in the illustration.

** Includes all listed items.

Section III. SPECIAL TOOLS, TEST, AND SUPPORT EQUIPMENT FOR FIBEROPTIC BRONCHOSCOPE

(1) ILLUSTRATION		(2)	(3)	(4)	(5)
FIG NO.	ITEM NO.	NATIONAL STOCK NUMBER	DESCRIPTION	UNIT OF MEASURE	QTY
			THERE ARE NO SPECIAL TOOLS, TEST, OR SUPPORT EQUIPMENT APPLICABLE FOR THIS END ITEM.		

GLOSSARY

AFR	Air Force regulation
AR	Army regulation
CAGE	Commercial and government entity
CAT	Catalogue
Click/clicking	A brief, sharp, nonresonant sound when using the deflection control in the ratchet mode.
cm	Centimeter
CVC	Calibration/verification/certification
°C	Degrees Celsius
°F	Degrees Fahrenheit
DLAM	Defense Logistics Agency manual
DPSC	Defense Personnel Support Center
DS	Direct support
EA	Each
EtO	Ethylene oxide
FIG	Figure
FM	Field manual
FSCM	Federal supply code for manufacturers. This is an obsolete term. CAGE (commercial and government entity) is the correct acronym.
GL	Gallon
GS	General support
Hg	Mercury
in	Inch
KT	Kit
lpm	Liter per minute
MAC	Maintenance allocation chart
mm	Millimeter
MPL	Mandatory parts list
MTOE	Modified table of organization and equipment
No.	Number
NSN	National stock number

PCB	Printed circuit board
PG	Package
PMCS	Preventive maintenance checks and services
psi	Pounds per square inch
QC	Quality control
QT	Quart
QTY	Quantity
RPL	Repair parts list
SB	Supply bulletin
SER	Serial
TB	Technical bulletin
TDA	Table of distribution and allowances
TM	Technical manual

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Change electrical cable to electrical assembly.

REASON: Corrects nomenclature.

Reverse call-out numbers 4 and 8.

REASON: Correctly identifies part.

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John Doe

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